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400 COMMONWEALTH DRIVE, WARRENDALE, PA 15096

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

AMS 7705B

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Superseding AMS 7705A

MAGNETIC ALLOY BARS AND FORGINGS
Nickel-Iron Alloy

1. SCOPE:

1.1 Form: This specification covers a magnetic nickel-iron alloy in the form of bars, forgings, and forging stock.

1.2 Application: Primarily for parts used in magnetic circuits requiring high magnetic permeability at low flux densities after high temperature annealing in hydrogen.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2241 - Tolerances, Corrosion and Heat Resistant Steel, Iron Alloy, Titanium, and Titanium Alloy Bars and Wire
MAM 2241 - Tolerances, Metric, Corrosion and Heat Resistant Steel, Iron Alloy, Titanium, and Titanium Alloy Bars and Wire
AMS 2350 - Standards and Test Methods
AMS 2371 - Quality Assurance Sampling of Corrosion and Heat Resistant Steels and Alloys, Wrought Products Except Forgings and Forging Stock
AMS 2374 - Quality Assurance Sampling of Corrosion and Heat Resistant Steels and Alloys, Forgings and Forging Stock
AMS 2806 - Identification, Bars, Wire, Mechanical Tubing, and Extrusions, Carbon and Alloy Steels and Heat and Corrosion Resistant Steels and Alloys
AMS 2808 - Identification, Forgings

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM A596 - Direct-Current Magnetic Properties of Materials Using Ring Test Procedures and the Ballistic Methods
ASTM A773 - Direct-Current Magnetic Properties of Materials Using Ring and Permeameter Procedures with D-C Electronic Hysteresigraphs
ASTM E18 - Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials

2.3 U.S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

MIL-STD-163 - Steel Mill Products, Preparation for Shipment and Storage

3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall be a metallic alloy containing approximately 80% nickel Ø plus iron and other alloying elements, usually copper and chromium or molybdenum, in such proportions as will provide a product meeting the requirements of 3.3.

3.2 Condition: The product shall be supplied in the following condition:

3.2.1 Bars: Annealed and descaled.

3.2.2 Forgings: As ordered.

3.2.3 Forging Stock: As ordered by the forging manufacturer.

3.3 Properties: The product shall conform to the following requirements:

3.3.1 Bars and Forgings:

3.3.1.1 Hardness: Bars and forgings after being annealed, shall have hardness not higher than 75 HRB, or equivalent, determined in accordance with ASTM E18.

3.3.1.2 Magnetic Properties: Shall be as follows, determined in accordance with Ø ASTM A596 or ASTM A773 after annealing the product by heating, in a dry hydrogen atmosphere having a dew point of -60°F (-50°C) or lower, to 2150°F ± 25 (1175°C ± 15), holding at heat for 4 hr ± 0.25, and cooling to 800°F (425°C) or below at a rate not greater than 100°F (55°C) per hr in a non-oxidizing atmosphere:

3.3.1.2.1 Ø	Maximum permeability, min	175,000
3.3.1.2.2 Ø	Permeability at 100 gausses, min	42,000
3.1.2.3	Induction at 100 oersteds, gausses, min	7,500

3.3.2 Forging Stock: As agreed upon by purchaser and vendor.

3.4 Quality: The product, as received by purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from imperfections detrimental to usage of the product.

3.5 Tolerances: Bars shall conform to all applicable requirements of AMS 2241 or MAM 2241.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the product shall supply all Ø samples for vendor's tests and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.4. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to the requirements of this specification.

4.2 Classification of Tests: Tests to determine conformance to all technical Ø requirements of this specification are classified as acceptance tests and shall be performed on each heat or lot as applicable.

4.3 Sampling: Shall be in accordance with the following; a lot shall be all Ø product of the same nominal size from the same heat processed at the same time and presented for vendor's inspection at one time:

4.3.1 Bars: AMS 2371.

4.3.2 Forgings and Forging Stock: AMS 2374.

4.3.3 Sampling for magnetic properties shall be as agreed upon by purchaser and vendor.

4.4 Reports:

4.4.1 The vendor of the product shall furnish with each shipment a report showing the results of tests for composition, when specified, and magnetic properties of each heat and for hardness of each lot. This report shall include the purchase order number, heat number, AMS 7705B, size, and quantity. If forgings are supplied, the part number and the size and melt source of stock used to make the forgings shall also be included.

4.4.2 The vendor of finished or semi-finished parts shall furnish with each shipment a report showing the purchase order number, AMS 7705B, contractor or other direct supplier of material, part number, and quantity. When material for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of material to determine conformance to the requirements of this specification and shall include in the report either a statement that the material conforms or copies of laboratory reports showing the results of tests to determine conformance.

4.5 Resampling and Retesting: Shall be in accordance with the following:

4.5.1 Bars: AMS 2371.

4.5.2 Forgings and Forging Stock: AMS 2374.